

(38)

$$y = \frac{1}{4}x^3(x^2 - 9)$$

$$0 = \frac{1}{4}(x)^3(x^2 - 9)$$

$$\downarrow \quad \downarrow \quad \downarrow$$

$$\text{zeros} \rightarrow 0, -3, 3$$

(32)

$$y = x^4 - x^3 - 20x^2$$

$$0 = (x^2)(x^2 - x - 20)$$

$$(x^2)(x-5)(x+4)$$

$$\downarrow$$

$$\text{zeros } 0, 5, -4$$

(45)

$$y = 4x^3 - 20x^2 + 25x$$

$$0 = (x)(4x^2 - 20x + 25)$$

$$(x)(2x-5)(2x-5)$$

$$\downarrow$$

$$\text{zeros} = 0, \frac{5}{2}, \frac{5}{2}$$

$$2x - 5 = 0$$

$$+5 \quad +5$$

$$2x = 5$$

$$x = \frac{5}{2}$$



(53) $0, -2, -3$

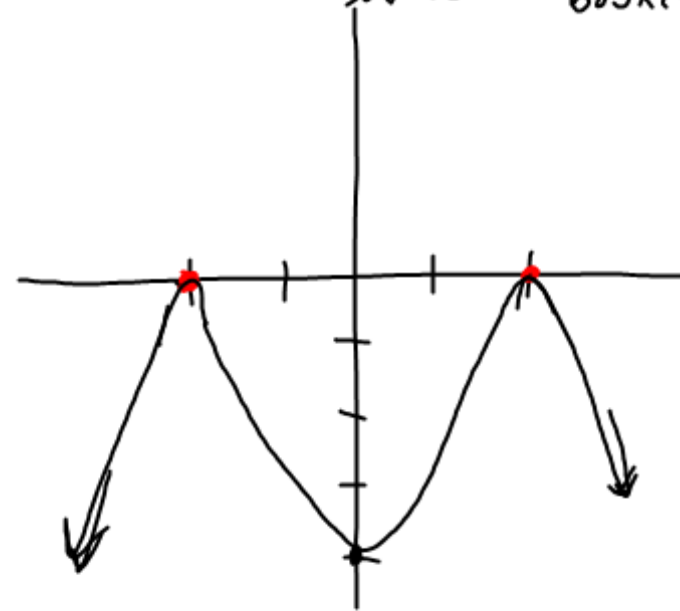
$$y = (x)(x+2)(x+3)$$

(71) $y = -\frac{1}{4}(t-2)^2(t+2)^2$

Degree = 4th

L.L. = neg

Zeros = $\underbrace{2, 2}_{\text{bounce}}, \underbrace{-2, -2}_{\text{bounce}}$



$$(67) \quad y = -x^3 - 5x^2$$

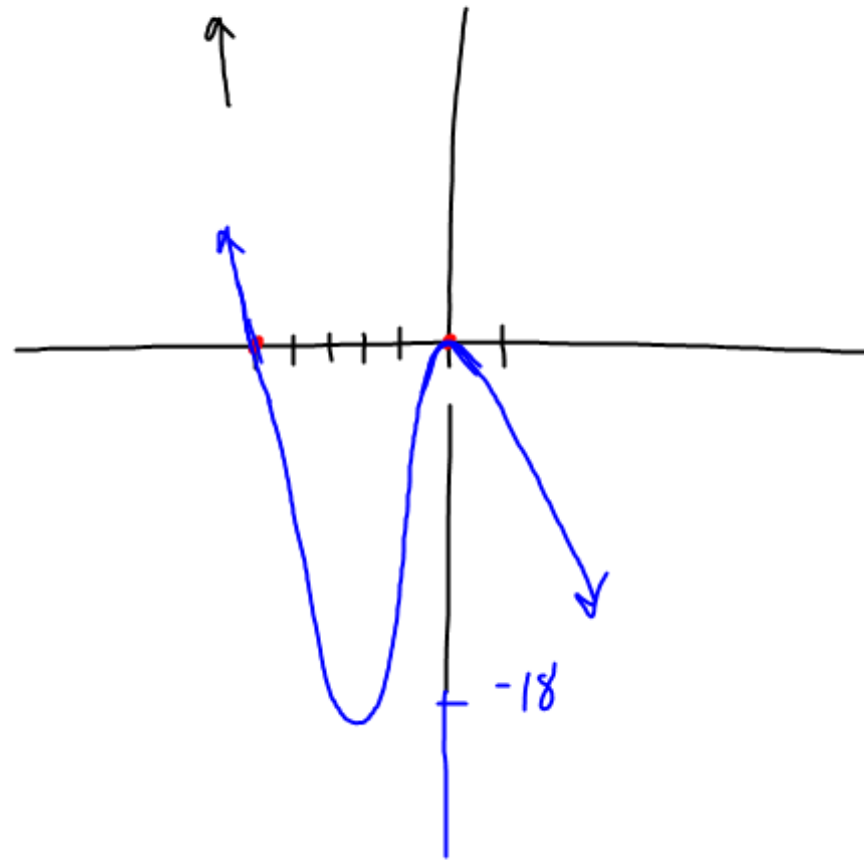
$$y = -x^2(x + 5)$$

Degree = 3rd

L.C. = neg.

zeros = $\underbrace{0, 0}_{\text{bwnce}}, \underbrace{-5}_{\text{cross}}$

$$\begin{aligned} f(-4) &= -16 \\ f(-3) &= -18 \\ f(-2) &= -12 \end{aligned}$$



32)

$$0 = x^4 - x^3 - 20x^2$$

$$0 = (x)^2(x^2 - x - 20)$$

$$\downarrow (x-5)(x+4)$$

$$x = 0, 5, -4$$

38)

$$0 = \frac{1}{4}x^3(x^2 - 9)$$

$$\downarrow (x-3)(x+3)$$

$$x = 0, 3, -3$$

45)

$$y = 4x^3 - 20x^2 + 25x$$

$$0 = (x)(4x^2 - 20x + 25)$$

$$\downarrow (2x-5)(2x-5)$$

$$0 = 0, \frac{5}{2}, \frac{5}{2}$$

$$2x - 5 = 0$$

$$+5 \quad +5$$

$$2x = 5$$

$$x = \frac{5}{2}$$

$$x^2 - 5x + \frac{25}{4}$$

$$x^2 - 5x + \frac{25}{4} = -\frac{25}{4} + \frac{25}{4}$$

$$4 \cdot \left(x - \frac{5}{2}\right)^2 = 0 - 4$$

$$4\left(x - \frac{5}{2}\right)^2 = 0$$

$$\begin{array}{r}
 120R1 \\
 8 \overline{) 961} \\
 \underline{-8} \downarrow \\
 16 \downarrow \\
 \underline{-16} \downarrow \\
 01 \\
 \downarrow \\
 \underline{0} \\
 1
 \end{array}$$

$$120 \frac{1}{8}$$

Listen for these things

- Division - gets factors
 - may lead to zeros
 - put in place holders
- Synthetic Division
 - only linear factors with 1 before x
 - put in place holders
- Remainder Theorem

$$0 = 2x^2 + 8x + 3 \quad \div \text{by } 2$$

Quiz

$$0 = x^2 + 4x + \frac{3}{2}$$

$$\frac{1}{2}(4) = 2^2 = 4$$

$$x^2 + 4x + 4 = \frac{-3}{2} + 4$$

$$(x+2)^2 = 2.5$$

$$2(x+2)^2 - 5 = y$$

vertex $(-2, -5)$

roots 2 pts, 1 pt w/o 2

1 pt
 $\frac{1}{2}$ pt for $\frac{1}{2}$ pt.

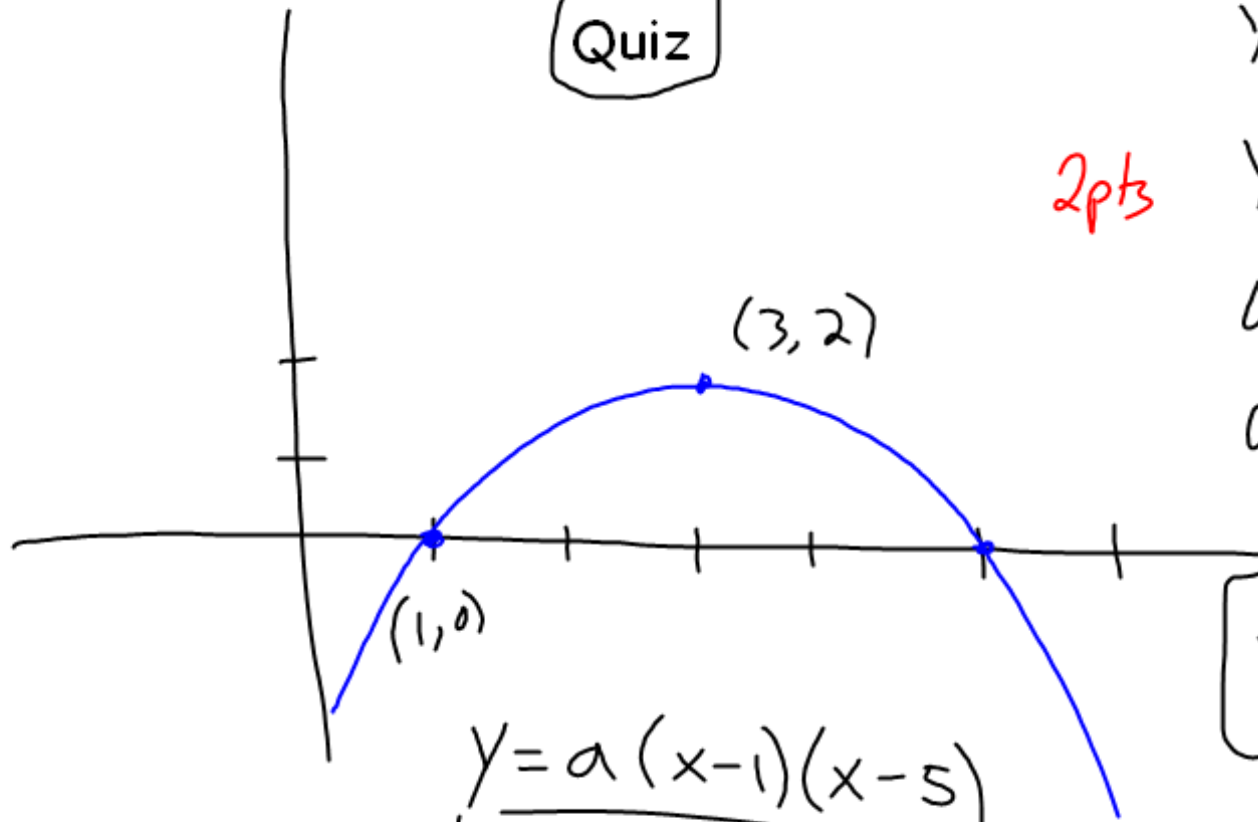
$$2(x+2)^2 = 5$$

$$(x+2)^2 = \frac{5}{2}$$

$$x+2 = \pm \sqrt{\frac{5}{2}}$$

$$\Rightarrow \begin{cases} x = -2 \pm \sqrt{\frac{5}{2}} \\ x = -2 \pm \frac{\sqrt{10}}{2} \end{cases} \text{ OR } 2 \text{ pts}$$

Quiz



$$y = a(x-1)(x-5)$$

$$y = -\frac{1}{2}(x-1)(x-5)$$

2pts

$$y = a(x-h)^2 + k$$

$$y = a(x-3)^2 + 2$$

$$0 = a(1-3)^2 + 2$$

$$0 = 4a + 2$$

$$a = -\frac{1}{2}$$

$$y = -\frac{1}{2}(x-3)^2 + 2$$

↓
1pt↓
1pt↓
1pt

"

Sect. 2.3

1-4, 8, 13-15, 31, 35, 39